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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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09/768,133

01/23/2001

Ritsuko Nagao

SEL 236

3327

7590

08/08/2005

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EXAMINER

PHAM, THANH V

ART UNIT

PAPER NUMBER

2823

DATE MAILED: 08/08/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/768,133

Applicant(s)

NAGAO ET AL.

Examiner

Thanh V. Pham

Art Unit

2823

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 05 July 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-10, 12, 14, 16, 18, 20, 22, 24, 26, 28 and 30-183 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30-183 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submissions filed on 07/05/2005 and 06/07/2005 have been entered.

Response to Amendment

Drawings

2. The drawings were received on 06/07/2005. These drawings are acceptable.

Claim Rejections - 35 USC § 103

3. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

4. Claims 1-10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30-183 are rejected under 35 U.S.C. 103(a) as being unpatentable over applicant's admitted prior art in combination with Chen U.S. Patent No. 5,453,406, Tang et al. US 5,550,066 and Hanihara et al. US 5,990,988.

The applicant's admitted prior art for the TFT formation to form a display device having pixel electrodes and an insulative layer over the pixel electrodes is similar to the

instant invention, having use of an organic material where a low dielectric property is considered (the instant specification, pages 1-2 and 7).

An active matrix liquid crystal display device is widely used for OA equipment, television sets and the like.

The substrate is spun so that the varnish is uniformly applied thereto. The substrate on which the varnish is applied is baked in an oven or on a hot plate to obtain an insulating film.

The thickness of the insulating film is controlled by the number of spinings, the period of spinning time, the concentration and the viscosity of the varnish. A material used for spin-coating can be selected from a polyimide resin, an acrylic resin, a resin containing a siloxane structure, an inorganic SOG (Spin on Glass) material and the like, in consideration of physical properties such as a transparency, a heat resistance, a chemical resistance, and a thermal expansion coefficient. In the case where a low dielectric property is considered as an important factor, an organic material is often used.

FIG. 2 shows a cross section of a conventional active matrix substrate. On a glass substrate 100, level differences generated by an active layer (including a channel region 101, a source region 102, and a drain region 103), a gate wiring 105, a source wiring 107, a drain wiring 108 and the like are present. A leveling resin, representatively an acrylic resin, is used to as a first leveling film 109 so as to level these level differences. Finally, a pixel electrode 111 is formed on the first leveling film 109 to complete the active matrix substrate.

Next, as shown in FIG. 3, the active matrix substrate is bonded to a counter substrate 120 so as to interpose liquid crystal 123 therebetween to form a liquid crystal display device. According to this conventional method of forming a leveling film, however, it is apprehended that the pixel electrode 111 might be broken because of insufficient flatness of the leveling film. Moreover, since the unevenness due to the level differences remains on the surface of the pixel electrode 111, poor orientation of the liquid crystal 123 is caused on the uneven region of the surface.

Further, in applicant's admitted prior art fig.3, an electro luminescence layer 112 is formed over the pixel electrode 111.

In the Summary of the Invention as filed on 01/23/2001, page 7, the instant specification states "a TFT is formed in a similar manner as in the prior art shown in Fig. 2". The applicant's admitted prior art lacks the second leveling layer over the first leveling layer.

The Chen reference discloses a method for producing a planar surface (col. 2, lines 64-67) wherein the thickness of a first leveling film 40 (2,000-3,000 Angstroms, col. 6, lines 1-10) formed above a wiring 34 is thinner than that of a second leveling film 42 (4,000-6,000 Angstroms, col. 6, line 53-54) formed on the first leveling film. Both first and second leveling films are formed by spin coating and by the same material (col. 6, line 30). The method could be used to coat a display device.

In Chen's fig. 7, a second spin-on-glass layer 42 is formed over the first spin-on-glass layer 40 essentially planarizing the dielectric layer and completing the process. This second spin-on-glass layer 42 is formed by also using the liquid precursor of the siloxane type similar in composition to the material used for the first spin-on-glass layer 40, but in this second coating the spin-on-glass is dispensed at a significantly higher spin speed and at a constant speed. The same series of spin-on-glass is used for both layers.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to provide the applicant's admitted prior art with the second leveling layer as taught by Chen because the second leveling layer of Chen would provide the prior art structure with planarity over the formed TFT to prevent the pixel electrode from rough topography and improve the optical resolution (Chen's col. 1, lines 18 and 29).

Choice of thickness of the leveling layers would depend on many other factors such as the gap between the protruded elements or the height of the protruded element and would be obtained by routine experimentation, MPEP 2144.05. It would have been obvious to one of ordinary skill in the art at the time the invention was made to apply the appropriate thickness such as the thickness in the ranges as claimed into the process as the thickness would be selected in accordance with the surface planarity formation as taught by Chen.

Re claim 8, the applicant's admitted prior art discloses the driving TFT section but not the section of pixel TFT for controlling electric current to the EL element; therefore, it does not show the EL cathode. However, the formation of a cathode made of a conductive film having a light shielding property is known in the art as EL cathode 84 in the Tang et al.'s figs. 3 and 9 and the associated passages. It would have been obvious to one of ordinary skill in the art at the time of the invention to provide the method of the combination with the formation of a cathode made of a conductive film having a light shielding property of Tang et al. because the formation of a cathode made of a conductive film having a light shielding property of Tang et al. would provide the method of the combination with sufficiently low temperature fabrication (abstract and col. 2, line 61, e.g.)

Re claims 37, 46, 55, 64, 73, 82, 91, 101, 111, 121, 131, 141, 152, 164 and 176, the applicant's admitted prior art does not disclose the wiring is a three-layered laminated film containing a first titanium, an aluminum film and a second titanium film. The Hanihara et al. reference teaches "the wiring layers 31, 32, 33 and the pixel

electrode layer 34 are films made of such conductive metals as ... layers of titanium and aluminum formed by sputtering or evaporation or photolithography" (col. 6, lines 18-24). It would have been obvious to one of ordinary skill in the art at the time of the invention to provide the method of the combination with the layers of titanium and aluminum as taught by Hanihara et al. because the layers of titanium and aluminum for the wiring would provide the device formed by the combination with controllability (col. 1, line 9).

Response to Arguments

5. Applicant's arguments filed 06/07/2005 have been fully considered but they are not persuasive.

Applicant argues that neither applicant's admitted prior art nor Chen discloses or suggests forming an EL layer. Applicant is directed to fig. 3 of applicant's admitted prior art where layer 112 is formed over pixel layer 111. The planar surface method of Chen is used in the applicants' admitted prior art wherein conventional fig. 3 shows forming one of a layer selected from the group consisting of a liquid crystal layer and an EL layer over the pixel electrode. The employment of Chen, the formation of a transistor, into the applicants' admitted prior art's layers 701-706 would be appropriated in the art of manufacturing LCD or EL. The planar surface formed by Chen's method is good enough to provide the flat surface of the second organic/inorganic leveling film of the claimed invention in addition to the advantages as argued.

Conclusion


6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.
7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thanh V. Pham whose telephone number is 571-272-1866. The examiner can normally be reached on M-T (6:30-5:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew Smith can be reached on 571-272-1907. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

TP

07/29/2005


George Fourson
Primary Examiner